

Polystichum \times *californicum* (D. C. Eaton) Diels (pro sp.). [The combining authority is wrongly given as Underwood in Munz (*A California flora*, 1959; *Supplement*, 1968) and in many other places.] $2n = ca\ 82$; five cells counted from three plants, showing from $9\ II + 64\ I$ to $23\ II + 34\ I$. Spores abortive but with many large, globose (unreduced?) spores also present. California: Monterey Co., Pfeiffer Big Sur State Park, Pine Ridge trail, *Smith* 562, 563, 564 (UC). Growing with *P. dudleyi* and *P. munitum*. Wagner (Amer. Fern J. 63:99–115. 1973) showed that *P. californicum* is the hybrid between *P. munitum* and *P. dudleyi*, and my observations confirm this. *Polystichum californicum* exists in both a sterile $2x$ form and a fertile $4x$ form, but only $2x$ plants were encountered in my small sample. Wagner does not elaborate on the distribution of the two cytotypes, and this is a point that ought to be pursued.

Polystichum dudleyi Maxon. $2n = 41\ II$. California: Monterey Co., Julia Pfeiffer Burns State Park, *Smith* 552 (UC); Monterey Co., Pfeiffer Big Sur State Park, Pine Ridge trail, *Smith* 559, 560 (UC).

Polystichum munitum (Kaulf.) Presl. $2n = 41\ II$. California: Siskiyou Co., Callahan to Somes Bar, *Smith* 571 (UC); Monterey Co., ca 2 km (1.2 mi) from Alder Creek campground, *Smith* 598 (UC).

Woodsia plummerae Lemmon. $2n = 76\ II$. California: San Bernardino Co., New York Mts., *MacNeill s.n.* (UC). This is both the first chromosome report for this species and the first certain report of the occurrence of *W. plummerae* in California, a previous report from San Diego Co. being questionable due to possible mixing of labels (Munz, *A supplement to a California flora*, 1968). The mountains of the eastern Mojave Desert are the western limit for several other ferns, including *Notholacna sinuata*, *Cheilanthes feei*, *C. wootonii*, and *Pellaea longimucronata* (Pray, loc. cit.).

I thank Don MacNeill for allowing access to his collection of living ferns, from which several chromosome counts were made.—ALAN R. SMITH, Department of Botany–Herbarium, University of California, Berkeley 94720.

SEED DISPERSAL OF DENDROMECON BY THE SEED PREDATOR POGONOMYRMEX.—Harvester ants, certain Myrmicinae including *Pogonomyrmex*, are such effective seed predators that seed dispersal by ants (myrmecochory) has been considered impossible in the vast hot-arid regions of harvester ant prominence. Berg (Amer. J. Bot. 53:61–73. 1966) demonstrated myrmecochory of *Dendromecon rigida* Benth. in California chaparral but did not document any relationship with harvester ants, either predator avoidance mechanisms or local allopatry. I have found that in early summer *Pogonomyrmex subnitidus* Emery systematically collects seeds of *D. rigida*, removes the elaiosome in the nest, and discards the intact seed. This harvester ant is a dispersal (transport) agent and not a predator of *D. rigida*.

The cooccurrence of the plant and ant were quantified (Sep 1972) on a 27,500 m² site (burned Sep 1970) at Saddle Peak in the Santa Monica Mountains: there were a transect-estimated 200,000 *D. rigida* and 23 *P. subnitidus* nests. The association is enhanced by the failure of *D. rigida* seeds to germinate except after brush fires or severe disturbance, and the requirement of *Pogonomyrmex* for open sites for nesting.

A species of *Campanotus* was also present but its numbers were not estimable. This formicine also transports *D. rigida* seeds, but the discarded seeds remain in subterranean middens. Seeds on *P. subnitidus* middens may readily roll or be washed away. But, while on the midden, they apparently have a significant advantage over uncollected seeds in predation avoidance. In late October a single midden (to 2.5 cm deep, more than 10 m²) contained 522 seeds of *D. rigida*, 464 intact; 23 *Lupinus* seeds were also found, 1 intact. A 3 m diameter sample 15.5 m from the nest and among dense *D. rigida* contained no whole seeds but 23 fragmented seeds; no *Lupinus* were found.

Another case of seed dispersal by harvester ants was subsequently found by Drs. Ruth Bernstein and M. L. Cody of this department in April, 1973, about 25 km south of San Felipe in the Sonoran desert of Baja California. There *Veromessor pergandei* Mayr were transporting appendaged seeds of *Datura discolor* Bernh. to the nest and discarding seeds without appendage from the nest.—STEPHEN H. BULLOCK, Biology Department, University of California, Los Angeles 90024.

REDESCRIPTION OF *ERIOGONUM HOFFMANNII*, A DEATH VALLEY ENDEMIC.—*Eriogonum Hoffmannii* was first collected by Ralph Hoffmann on September 30, 1931, in Wildrose Canyon on the west slope of the Panamint Mountains, Inyo County, California. The species was named and described by Susan G. Stokes (Leaf. W. Bot. 1:23. 1932). Neither the original description nor more recent ones, however, have noted the most distinctive features of the species, particularly characteristics of the calyx lobes in fruit. Apparently this buckwheat is rarely collected and little known.

Having observed it in the field on three occasions, followed by more detailed study of fresh specimens and herbarium material (including an isotype at CAS), I describe it as follows (see also fig. 1):

Annual, 1–5 dm high, glabrous except as noted; stem solitary, or with one or two lesser stems from the base, all with spreading branches; leaves basal, 1–4 cm long, equally wide, suborbicular to subcordate, densely white-tomentose below, less so above; floral bracts minute, ciliate with fine curly hairs; involucre ca 2 mm long, sessile, erect, at the nodes or terminal on short branchlets, many flowered (up to 25), 5-lobed, ciliate with fine curly hairs; calyces 1.5–2.5 mm long, divided to near the base, pale when immature, turning deep pink to wine-red with darker midribs in age; outer segments ovate to lanceolate, tapering from a squarish to slightly cordate base to a narrow blunt tip, thick and rather fleshy with a distinctive vesicular texture; inner segments shorter, thin and translucent, more or less elliptic; achenes pale, slightly longer than the calyx, ca 2 mm long, base broad, tapering to a 3-angled beak of nearly equal length. A common feature of the species is a tuft of short branches stiffly surrounding the lower node, often with lesser tufts at the nodes above and occasionally at the base with the leaves.

Variety *robustius* S. Stokes is a more robust form that grows up to 10 dm high. Besides the sturdy main stem, there are usually several lesser stems. Leaves are 2–5 cm long and 3–8 cm wide, often crisped, and may sheath the base of the stem for 1–3 cm. These larger plants are less inclined to develop the tufts of short branches at the nodes. The inflorescence and achenes are the same.

My field observations were made in the Emigrant Canyon area of the Panamint Mountains, between October 13 and November 13, in the favorable year of 1973. The species was fairly plentiful between 1067 m in the main canyon and 1463 m in a tributary wash. Variety *robustius* was common below, gradually giving way to the type variety as the elevation increased. Variety *robustius* may be merely large specimens of the species growing under more favorable circumstances, such as at lower elevations and where there may be more moisture available. The plants were associated with *Eriogonum brachypodum* T. & G. in the upper range and with *E. Rixfordii* S. Stokes lower in the canyon. *Larrea tridentata* Sesse & Mocino (Creosote Bush) grew on the slopes of the canyon but did not descend to the washes where erigonums grew profusely. *Eriogonum Hoffmannii* matures later than most of its associates and was at its prime in mid-November.

It is probably more than an interesting coincidence that this endemic appears to be restricted to ancient lakebed formations. Perhaps its distribution is determined by an affinity for gypsum or one of its associates. Collection sites for the species are in the Panamint Mountains between 1067 m and 1524 m elevation. Variety *robustius* has also been collected at Furnace Creek Ranch, 366 m, and Ryan Wash, 457 m. Most of these locations are within the boundaries of Death Valley National Monument.—MARY DEDECKER, P.O. Box 506, Independence, California 93526.